

## Anchoring a lander on an asteroid using foam stabilization, Phase I

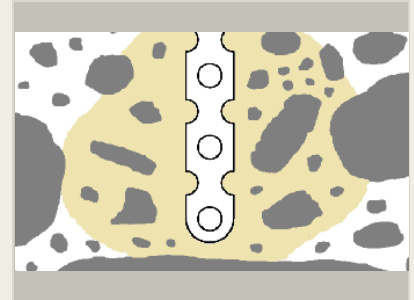
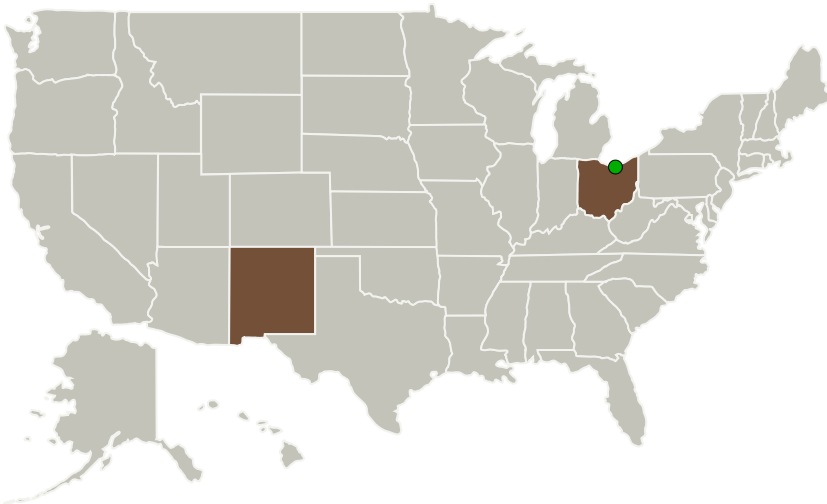


Completed Technology Project (2013 - 2013)

## Project Introduction

NASA has proposed several missions to land a craft on an asteroid and potentially to return samples from it. While large asteroids in the asteroid belt can exhibit a significant amount of gravity, most near-earth asteroids are small and show a surface gravity of less than 0.1% of earth. Landing, and staying on the surface of such a small object is a challenge, especially for manned missions. Just the movement of an astronaut in and out of the lander during excursions would most likely dislodge the vehicle. Similarly, drilling for a sample return mission requires the ability to exert force onto the surface without pushing the lander off the surface. A solid anchoring system is required, but made difficult due to the potentially rubble-like consistency of small asteroids, which makes classic mechanical anchoring difficult. Adherent Technologies, Inc. (ATI) has developed innovative materials for space use for over a decade. These include inflatable structures, self-sealing membranes, coatings for satellites and solar sails, and vacuum-deployable foams. The proposed program will combine these technologies to produce an anchoring system that deploys either a sticky screen that can attach to a solid rock formation or a foam injection anchor that can bind a large amount of rubble as an anchoring point. The system is modular, and a decision which anchoring method to use only needs to be made on location.

## Primary U.S. Work Locations and Key Partners

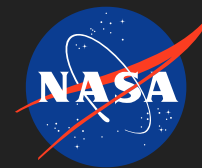


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Organizations Performing Work	Role	Type	Location
Adherent Technologies, Inc.	Lead Organization	Industry	Albuquerque, New Mexico
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
New Mexico	Ohio

## Project Transitions

▶ **May 2013:** Project Start

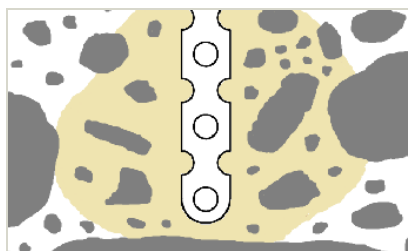
✓ **November 2013:** Closed out

**Closeout Summary:** Anchoring a lander on an asteroid using foam stabilization, Phase I Project Image

**Closeout Documentation:**

- Final Summary Chart Image(<https://techport.nasa.gov/file/138005>)

## Images



**Briefing Chart Image**

Anchoring a lander on an asteroid using foam stabilization, Phase I (<https://techport.nasa.gov/image/126873>)

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

Adherent Technologies, Inc.

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

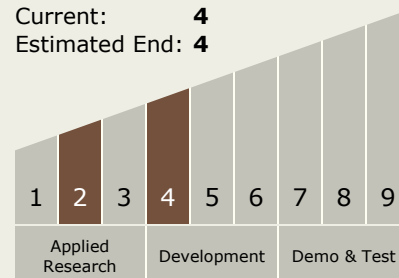
Carlos Torrez

**Principal Investigator:**

Jan-michael Gosau

## Technology Maturity (TRL)

Start: 2  
Current: 4  
Estimated End: 4



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## Technology Areas

### Primary:

- TX07 Exploration Destination Systems
  - └ TX07.1 In-Situ Resource Utilization
    - └ TX07.1.1 Destination Reconnaissance and Resource Assessment

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System